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Merchant investments in interconnections in the European electricity market

the AQUIND case

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Centre for Energy Economics Research (CEER)

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1. Introduction

In order to further improve both the efficiency of electricity markets and the reliability of electricity supply, the European Union wants to further integrate European electricity markets (European Commission, 2014). A crucial element in reaching this objective is extending the capacity of cross-border capacity between neighbouring markets. Currently the size of cross-border capacity compared to installed generation capacity is about 8% on average for EU countries, but the EU aims to raise this share to 15% by 2030. In the recent past a number of new interconnections have been build, and many more are likely to come.

One of the plans for increasing interconnections is the AQUIND interconnector. The AQUIND Interconnector is a proposal by private investors to build and operate a new subsea and underground High Voltage Direct Current (HVDC) bi-directional connection of 2,000 MW between the South Coast of England and Normandy in France. This project would raise the size of interconnection capacity from about 4% to 6% of total installed generation capacity in the UK; for France hold similar numbers.[1]

This project has been designated as a Project of Common Interest (PCI) by the European Commission, which means that the project is viewed to be a key project towards the realisation of the targets regarding connecting European electricity markets. In addition, the UK government decided that the project is seen as a Nationally Significant Infrastructure Project. [2]

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[1] Sources: IEA Electricity Information 2017 and https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/357534/Imports_exports_and_transfers_of_electricity.pdf

[2] See http://aquind.co.uk/.

The interconnection is primarily meant for commercial trade based on price differences between the UK and French power market, but it can also be used for system support to the transmission networks in both countries by providing rapid voltage and frequency support during system disturbances.

The private investors of AQUIND requested the regulatory authorities in UK (Ofgem) and France (CRE) for exemption of regulation in May 2017, which means (among others) that they ask for permission not to use the revenues resulting from the allocation of the interconnection (solely) for maintaining or increasing the interconnection capacity and guaranteeing its actual availability.[3] These regulators referred this request to the European energy regulator (ACER) in December 2017. In June 2018, ACER decided negatively on this request, implying that the AQUIND interconnection should be built and operated subject to a regulatory regime.[4] In its appeal to this decision, the investors state that a merchant investor faces higher risks than an incumbent investor but that these risks are not adequately compensated under a regulatory regime.[5] As a consequence, the merchant investor would not be able to finance the investment by acquiring equity and debt capital needed.

In this policy paper I reflect on the question to what extent a merchant investor is restricted in its abilities to finance an

[3] EU Regulation on conditions for access to the network for cross-border exchanges in electricity, 714/2009, Art. 16(6).
[4] See https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Individual%20decisions/ACER%20Decision%2005-2018%20on%20AQUIND.pdf
[5] See https://www.acer.europa.eu/en/The_agency/Organisation/Board_of_Appeal/Annoucements%20of%20Appeal/Case%20A-001-2018%20AQUIND%20Limited_ACER.pdf

interconnector due to the constraints of a regulatory regime.[6] One of the key elements to be discussed is the actual costs of capital of a merchant investor in relation to the compensation offered for these costs by the regulatory regime. Before going into this topic, first the general background of merchant investments is briefly discussed.

[6] This note is based on a review of recent economic literature and information provided in public sources.

2. Regulated versus merchant investments

Building (new) interconnection capacity between two power markets may result in lower overall costs of generation as it enables low-cost producers to export power to the neighbouring market where the system marginal costs (and price) are higher. This is a major source of the potential welfare contribution of interconnectors (Dutton et al., 2017). In addition, reducing barriers between markets may result in fiercer competition because of the increase in number of suppliers while it may also result in higher reliability because of the higher availability of flexibility options to deal with variations in supply and demand.

The highest welfare improvement is realised when the investment is done by a public investor who maximizes social welfare (Sereno, et al., 2018). In theory, the welfare-maximizing design of an investment is where the marginal social benefits equal the marginal social costs of the investment. There are, however several factors which may make that the incumbent investors (TSOs[7]) are not able to realize this point of investing in interconnections. These investors do not always have the incentives to make these investments (for instance, because of lack of unbundling with commercial activities in generation), regulators may not be able to commit to a long-term policy regarding allowed revenues, while there may also be coordination problems between the regulators of the markets on both sides of the interconnection (Rubino, et al., 2015; Dutton et al., 2017; Gerbaulet et al., 2018). Therefore, merchant investors may be an alternative to realize more, welfare-improving interconnections.

The major difference between a merchant investment and a similar investment done by an incumbent utility, is that the objective

[7] Transmission System Operators.

is to maximize the congestion profits resulting from using the line. As a result, a merchant investor does not want to remove all congestion as then the price differences between the two markets will vanish, and hence, no congestion rents can be earned anymore. Consequently, merchant investors have an incentive to invest less than what would be socially optimal (Blumsack et al., 2008; Sereno et al., 2018). Nevertheless, the merchant interconnections may create significant welfare effects. Gerbaulet et al. (2018) find that the welfare gain realised by merchant projects is about 70% of the maximum achievable welfare, while Doucet et al. (2013) also conclude that market forces may be able to provide the appropriate incentives for investments in transmission capacity.

Besides investing less than the socially optimal level, merchant investors may also have an incentive to depart from the optimal design of the investment as they maximize their private profits coming from congesting revenues instead of the benefits for the full network, including effects on reliability (Lamadrid et al., 2016; Gerbaulet et al., 2018). Indirect effects of a particular interconnection on the availability of capacity in other parts of the network, resulting from the physical (Kirchoff's) laws, may be neglected, just as the impact on reliability of the grid (Blumsack, et al., 2008).

In addition, merchant investments in interconnections may result in an uneven distribution of welfare resulting from the interconnection, i.e. merchant investors may acquire a major part of the welfare improvement of the interconnector if no additional (regulatory) conditions would be imposed on the merchant investment. Merchant investors sell the interconnection capacity to traders (or players in the electricity market); the maximum price these traders are prepared to pay is (theoretically) determined by the

(expected) differences in prices between both markets. The more the merchant investor is able to charge a fee for using the line which is close to this willingness-to-pay, the more the welfare improvement resulting from the interconnector is realised by the merchant investor. This is the fundamental economic effect that the owner of the scarce resource gets the scarcity rent, the so-called Ricardian rent.

This distributional effect of the welfare of an interconnection can be formulated in terms of the micro-economic concepts of consumer surplus (CS), producer surplus (PS) and the surplus for the scarce resource, in this case the interconnection (IS). These economic concepts are, however, not really useful for policy discussions in practice. The concepts CS, PS and IS are theoretical concepts, not saying much about which groups in society are receiving which part of the improvement in welfare. The CS refer to the surplus realised by all users of the commodity, which means in the case of energy that the 'consumers' mainly consist of large energy-intensive industries, possibly partly owned by a group of international investors. For PS holds more or less the same: the 'producers' are everyone who produces electricity, so including residential prosumers and small-scale wind parks. The IS can be acquired by a commercial investor, but this player can be a company as any other.

Hence, the conclusion of, for instance, Gerbaulet et al. (2018) that because of the fact the "merchant takes it all" having no interconnector is equal to having a merchant investment, is simply not correct. Such a conclusion is based on translating theoretical economic concepts as CS, PS and IS to the decision making in practice without paying attention to the players (firms, people) who are playing the role of consumer, producer and network operator. A merchant investment that generates a positive overall welfare is

always beneficial for society, even if the merchant investor acquires this welfare completely.

3. Risks and returns of a merchant investment under regulation

The revenues of a merchant investment in interconnection in an unregulated environment is determined by the market value of that interconnection, which depends on the expected differences in power prices between the two markets. The higher the (expected) price differences, the more traders are prepared to pay for getting access to the interconnection and the more they want to utilize the line. In a regulated environment, however, the revenues do not depend on price differences, but on the maximum tariffs set by the regulator(s) and the utilisation of the line. The key difference between regulated and unregulated situation is the level and certainty about the future prices and tariffs.

In principle tariff regulation imposed by regulators on network operators is basically meant to protect consumers (network users) from excessive (monopoly) tariffs while also giving incentives to the operator to operate as efficiently as possible. One condition for setting the level of tariffs is that these should be able to give sufficient compensation for both the operational and capital costs. The central parameter in the determination of the compensation for the capital costs is the WACC[8]. This parameter is the estimate by the regulator of the costs of using capital, both debt and equity. For both the cost of debt and the required return on equity, the risks for the investors have to be assessed.

The risks for the providers of debt are translated into the so-called debt premium: the extra compensation above the risk-free interest rate which is needed to compensate providers of debt for the

[8] Weigthed Average Costs of Capital.

extra risks incurred when they provide debt capital to the project. This risk is related to the ability of the company to pay the regular interests and to repay the debt. The level of the risk premium depends not only on the characteristics of an investment project, but also on the financial strength and the type of ownership of the company. If a regulator bases the risk premium on the financial rating of companies which are state owned and mainly active in regulated business, this premium may be too low for a company which faces a higher financial risk purely because of its type of ownership and character of (revenues from) other activities.

The risks for the providers of equity are translated into the so-called equity premium, which is the compensation required by investors as compensation for the non-diversifiable (or: systematic) risk. This premium depends on two parameters: the market-risk premium, which is the premium required by investors for investing in the (perfectly diversified) market portfolio, and the equity beta, which describes to what extend the risk of a specific project is related to the systematic, market risk.

The market-risk premium is completely independent of the characteristics of individual projects, so it does not matter whether a project is conducted by a TSO or a private-equity investor, the market-risk premium remains the same. The equity beta, however, is to some extent related to the characteristics of the investor. The equity beta depends on the asset beta, which describes how the risk of a project is related to the market risk, and the gearing, which is the ratio debt/equity in the project.

A merchant investor may face higher risks because it may be less well equipped to minimize the risks caused by general economic circumstances (i.e. the market risk) than a TSO operating the full

electricity grid. In addition, a merchant investor may be less able to attract debt than a TSO operating in a regulated environment and backed by the state as owner, which implies that the share of equity is higher (i.e. gearing is lower). A lower gearing implies that the asset risk is allocated over a higher amount of equity, which lowers the equity beta. It is an empirical matter which of the two effects dominates: the higher asset beta, raising the costs of equity, or the higher share of equity, reducing the required compensation per unit of equity.

4. Conclusion on AQUIND case

The AQUIND Interconnector has already been defined as a EU project of common interest (PCI) and a UK Nationally Significant Infrastructure project. Hence, one may conclude that the concerns resulting from the findings in economic literature that merchant lines may result in suboptimal or ill-designed interconnections, have been carefully addressed in this investment project. The project is seen as beneficial both for the UK and the European integrated electricity market.[9] The remaining issue is whether the operation of this line should be made subject to regulation and if so, which regulatory adaptations should be done, if any, to take into account the special characteristics of a merchant investor.

Whether or not to regulate an interconnector depends on a number of conditions[10], but the main issue of discussion refers to the risk incurred by the investor in relation to the compensation offered by the regulatory regime. The investment in the AQUIND interconnector is, without any doubt, a high-risk investment. The project is an irreversible long-term investment, where the revenues are highly uncertain. The future utilisation, i.e. the future exchange of electricity between UK and France, depends on developments in global energy markets (affecting fuel prices and, hence, system marginal costs of generation), domestic and European energy policies (e.g. regarding promoting renewable energy, closing and building new generation capacity (nuclear, coal)) as well as other investments in

[9] In its decision on the exemption request by AQUIND, ACER concludes that the interconnector investment is beneficial from a European energy-system wide perspective. See Section 6.4.8 in https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Individual%20decisions/ACER%20Decision%2005-2018%20on%20AQUIND.pdf

[10] Regulation EC 714/2009, Article 17(1).

interconnection (which will come given the EU ambition to raise the size of interconnection capacity to 15% of installed generation capacity).

Participating in such a risky project requires an expected return on investment which is significantly above the return in many other (regulated) projects. In principle, a regulatory framework should be able to provide the outlook on such a higher return, but in practice it might be complicated for the regulator to commit to either higher WACC's or to allow higher revenues. In any way, special arrangements within the regulatory framework are required to compensate for the relatively high risks of the interconnector (Poudineh et al., 2017). These arrangements need to be implemented independently on the type of company that is making the investment, TSO or merchant, purely based on the characteristics of the project.

In addition, a special arrangement in the regulatory treatments seems also to be needed if the investor is a non-TSO company, because of the different abilities to attract debt and equity compared to a TSO. These differences are related to a number of elements in the WACC. The required debt premium may be higher resulting from the fact that the investor may have a less strong financial rating than a state-owned network operator mainly operating in regulated business, the asset beta of an interconnector project operated by a non-TSO may be higher because of the possibly fewer number of options to minimize the risks than a TSO has, while the equity beta may be lower because of the lower gearing. In addition, the regulation may in itself create more risks for a non-TSO if it caps the revenues without giving the option to recover financial losses via raising revenues for other activities, as a TSO may be able to do (Rubino, et al., 2015).

If such arrangements in the regulatory treatment cannot be implemented with any certainty, the regulatory option may be less attractive making it non-viable, i.e. less effective as the risk would be too great for investors, than giving exemption of regulation to the merchant investor. This exemption may be subject to a number of conditions, as was also proposed by AQUIND in its exemption application[11], such as on the duration of the exemption, the maximum size of the revenues or the minimum capacity to be offered in a non-discriminating manner (Dutton, et al., 2017). Implementing such conditions may prevent that the merchant investor takes all the welfare benefits, which is a concern mentioned by a.o. Gerbaulet et al. (2018), without removing the incentives for realising the investment. The recent examples with the introduction of the cap-and-floor regimes for merchant interconnections show that hybrid forms of regulated and merchant lines can be effective solutions to realize more interconnection capacity by taking into account the requirements of both investors and network users (Strbac et al., 2014; Dutton et al., 2017; Poudineh et al., 2017).

[11] See Par. 124 in https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Individual%20decisions/ACER%20Decision%2005-2018%20on%20AQUIND.pdf

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In this policy paper the author reflects on the question to what extent a merchant investor is restricted in its abilities to finance an interconnector due to the constraints of a regulatory regime. The author discusses the specific risk characteristics of merchant investments and to what extent regulatory regimes can be adapted to control for these risks.

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